

## CLAIM

1. An image matching method for performing a matching images to linear components in a first image and  
5 a second image, the method comprising:  
a first step of performing an image processing for performing points in each image of the first image and the second image to a curved pattern and the linear components in each image to a plurality of  
10 overlapped curved-patterns, based on a distance from a reference position to a shortest point in a straight line passing through a point in the image and an angle between a straight line passing through the reference position and the shortest point and a reference axis including the  
15 reference position, and generating a first transformed image and a second transformed image, and  
a second step of performing a matching of the first image and the second image based on a degree of an overlap of the patterns in the first transformed image  
20 and the second transformed image generated in the first step and a matching or mismatching of the patterns in the first and second transformed images.
2. An image matching method as set forth in claim 1, wherein the first step comprises a third step of  
25 extracting regions each of which indicates a degree of

the overlap of the curved patterns in the transformed image equal to or greater than a threshold set in advance, from the first transformed image and the second transformed image, and

5                    wherein, in the second step, the matching of the first image and the second image are carried out based on the matching or mismatching of the patterns in the regions extracted from the first transformed image and the second transformed image respectively in the  
10 third step.

3.        An image matching method as set forth in claim 2, wherein, in the third step, the threshold is determined based on a size of the extracted region such that the size of the extracted region is larger than the  
15 set value.

4.        An image matching method as set forth in claim 2, wherein, in the third step, the threshold is determined based on the size of the extracted region such that the size of the extracted region is within the set  
20 value.

5.        An image matching method as set forth in claim 2, wherein, in the third step, the image is deleted when the size of the extracted region is less than the set value.

25        6.        An image matching method as set forth in

claim 1, wherein, in the first step, a Hough transform processing is performed to the first image and the second image to generate the first transformed image and the second transformed image.

5           7.     An image matching method as set forth in claim 1, wherein, in the second step, a comparison processing is performed to a plurality of different positional relationships in the first transformed image and the second transformed image generated in the first  
10    step, a similarity as a correlation value is generated based on a result of the comparison processing, and the matching of the first image and the second image are carried out based on the generated similarity.

          8.     An image matching method as set forth in  
15    claim 1, before the first step, further comprising a tenth step of performing a position correction processing to the first image and the second image,

                  wherein, in the first step, the image processing is performed to the first image and the second  
20    image which are results of the position correction processing in the tenth step to generate the first transformed image and the second transformed image.

          9.     An image matching method as set forth in claim 8, wherein, in the tenth step, as the position  
25    correction processing, a correlation value is generated

based on a phase component which is a result of a rotation angle correction processing or an enlargement ratio correction processing and the Fourier transform processing to the first image and the second image, and  
5 the position correction processing is performed to the first image and the second image based on the generated correlation value.

10. An image matching method as set forth in claim 8, wherein, in the tenth step, a plurality of the  
10 correlation value indicating a corrected position is generated by a correlation processing to the first image and the second image, and a plurality of the position correction processing is performed to the first image and the second image based on the generated correlation value,

15 in the first step, the image processing is performed to the results of the plurality of the position correction processing of the first image and the second image in the tenth step to generate the first transformed image and the second transformed image, and

20 in the second step, the correlation value is generated based on the patterns in the first transformed image and the second transformed image generated in the first step; and the matching of the first image and the second image are carried out based on the generated  
25 correlation value and the threshold set in advance.

11. An image matching method as set forth in claim 10, wherein, in the second step, the matching of the first image and the second image are carried out to the result of the plurality of the position correction processing generated in the first step based on the total amount of the correlation value corresponding to different positions and the threshold set in advance.

12. An image matching method for performing a matching images to linear components in a first image and a second image, the method comprising:

a first step of performing a Hough transform processing to the first image and the second image to generate a first transform image and a second transform image, and

15 a second step of performing a matching of the first image and the second image based on a degree of an overlap of patterns in the first transformed image and the second transformed image generated in the first step and a matching or mismatching of the patterns in the same.

20 13. An image matching apparatus performing a matching to linear components in a first image and a second image, the apparatus comprising:

a transform means for performing an image processing to the first image and the second image, the image processing by which points in each image are

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transformed to a curved pattern and linear components in each image are transformed to a plurality of overlapped curved-patterns based on a distance from a reference position to a shortest point in a straight line passing through a point in the image and an angle between a straight line passing through the reference position and the shortest point and a reference axis including the reference position, and generating a first transformed image and a second transformed image, and

10                   a matching means for performing a matching of the first image and the second image based on a degree of an overlap of the patterns in the first transformed image and the second transformed image generated by the transform means and a matching or mismatching of the patterns in the first and second transformed images.

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14.   An image matching apparatus as set forth in claim 13, further comprising a extraction means for extracting a region where the degree of the overlap of the curved patterns in the transformed image is equal to or greater than a threshold set in advance, from the first transformed image and the second transformed image,

20                   wherein the matching means performs the matching of the first image and the second image based on the matching or mismatching of the patterns in the regions extracted by the extraction means from the first

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transformed image and the second transformed image respectively.

15        15.    An image matching apparatus as set forth in claim 14, wherein the extraction means determines the threshold based on a size of the extracted region so as to be larger than the set value.

10        16.    An image matching apparatus as set forth in claim 14, wherein the extraction means determines the threshold based on the size of the extracted region so as to be within the set value.

17.    An image matching apparatus as set forth in claim 14, wherein the extraction means deletes the image when the size of the extracted region is equal to or less than the set value.

15        18.    An image matching apparatus as set forth in claim 13, wherein the transform means performs a Hough transform processing to the first image and the second image to generate the first transformed image and the second transformed image.

20        19.    An image matching apparatus as set forth in claim 13, wherein the matching means performs a comparison processing to a plurality of different positional relationships in the first transformed image and the second transformed image generated by the transform means, generates a similarity as a correlation

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value based on a result of the comparison processing, and performs the matching of the first image and the second image based on the generated similarity.

20. An image matching apparatus as set forth in  
5 claim 13, further comprising a position correction means for performing a position correction processing to the first image and the second image, before an operation of the transform means,

wherein the transform means performs the  
10 image processing to results of the position correction processing of the first image and the second image performed by the position correction means to generate the first transformed image and the second transformed image.

15 21. An image matching apparatus as set forth in claim 20, wherein the position correction means generates a correlation value based on a phase component which is a result of a rotation angle correction processing or an enlargement ratio correction processing and the Fourier  
20 transform processing to the first image and the second image, and performs the position correction processing to the first image and the second image based on the generated correlation value.

22. An image matching apparatus as set forth in  
25 claim 20, wherein the position correction means generates

a plurality of the correlation values each indicating a corrected position by a correlation processing based on the first image and the second image, and performs a plurality of the position correction processing to the first image and the second image based on the generated correlation value,

the transform means performs the image processing to the results of the plurality of the position correction processing of the first image and the second image by the position correction means to generate the first transformed image and the second transformed image, and

the matching means generates the correlation value based on the patterns in the first transformed image and the second transformed image generated by the transform means, and performs the matching of the first image and the second image based on the generated correlation value and the threshold set in advance.

23. An image matching apparatus as set forth in claim 22, wherein the matching means performs the matching of the first image and the second image to the result of the plurality of the position correction processing generated by the transform means based on the total amount of the correlation value corresponding to different positions and the threshold set in advance.

24. An image matching apparatus performing a matching to linear components in a first image and a second image, the apparatus comprising:

a transform means for performing a Hough  
5 transform processing to the first image and the second image to generate a first transform image and a second transform image, and

a matching means for performing a matching of the first image and the second image based on a degree of  
10 an overlap of patterns in the first transformed image and the second transformed image generated by the transform means and a matching or mismatching of the patterns in the first and second transformed images.

25. A program that causes an information  
15 processing device to perform a matching images to linear components in a first image and a second image, the program comprising:

a first routine for performing an image processing to the first image and the second image, by  
20 which points in each image are transformed to a curved pattern and linear components in each image are transformed to a plurality of overlapped curved-patterns based on a distance from a reference position to a shortest point in a straight line passing through a point  
25 in the image and an angle between a straight line passing

though the reference position and the shortest point and  
a reference axis including the reference position, and  
generating a first transformed image and a second  
transformed image, and

5                   a second routine for performing a matching of  
the first image and the second image based on a degree of  
an overlap of the patterns in the first transformed image  
and the second transformed image generated in the first  
routine and a matching or mismatching of the patterns in  
10 the first and second transformed images.

26.   A program as set forth in claim 25, in the  
first routine, further comprising a third routine for  
extracting regions each of which indicates a degree of  
the overlap of the curved patterns in the transformed  
15 image equal to or greater than a threshold set in advance,  
from the first transformed image and the second  
transformed image,

                  wherein, in the second routine, the matching  
of the first image and the second image are carried out  
20 based on the matching or mismatching of the patterns in  
the regions extracted from the first transformed image  
and the second transformed image respectively in the  
third routine.

27.   A program as set forth in claim 26, wherein,  
25 in the third routine, the threshold is determined based

on a size of the extracted region such that the size of  
the extracted region is larger than the set value.

28. A program as set forth in claim 26, wherein,  
in the third routine, the threshold is determined based  
5 on the size of the extracted region such that the size of  
the extracted region is within the set value.

29. A program as set forth in claim 26, wherein,  
in the third routine, the image is deleted when the size  
of the extracted region is equal to or less than the set  
10 value.

30. A program as set forth in claim 25, wherein,  
in the first routine, a Hough transform processing is  
performed to the first image and the second image to  
generate the first transformed image and the second  
15 transformed image.

31. A program as set forth in claim 25, wherein,  
in the second routine, a comparison processing is  
performed to a plurality of different positional  
relationships in the first transformed image and the  
20 second transformed image generated in the first routine,  
a similarity as a correlation value is generated based on  
a result of the comparison processing, and the matching  
of the first image and the second image are carried out  
based on the generated similarity.

25 32. A program as set forth in claim 25, before

the first routine, further comprising a tenth routine for performing a position correction processing to the first image and the second image,

wherein, in the first routine, the image  
5 processing is performed to results of the position correction processing to the first image and the second image in the tenth routine to generate the first transformed image and the second transformed image.

33. A program as set forth in claim 32, wherein,  
10 in the tenth routine, as the position correction processing, a correlation value is generated based on a phase component which is a result of a rotation angle correction processing or an enlargement ratio correction processing and the Fourier transform processing to the  
15 first image and the second image, and the position correction processing is performed to the first image and the second image based on the generated correlation value.

34. A program as set forth in claim 32, wherein,  
in the tenth routine, a plurality of the correlation  
20 values each indicating a corrected position is generated by a correlation processing based on the first image and the second image, and a plurality of the position correction processing are performed to the first image and the second image based on the generated correlation  
25 value,

in the first routine, the image processing is performed to the results of the plurality of the position correction processing of the first image and the second image in the tenth routine to generate the first

5 transformed image and the second transformed image, and

in the second routine, the correlation value is generated based on the patterns in the first transformed image and the second transformed image generated in the first routine, and the matching of the  
10 first image and the second image are carried out based on the generated correlation value and the threshold set in advance.

35. A program as set forth in claim 34, wherein, in the second routine, the matching of the first image  
15 and the second image are carried out to the result of the plurality of the position correction processing generated in the first routine based on the total amount of the correlation value corresponding to different positions and the threshold set in advance.

20 36. A program that causes an information processing device to perform a matching to linear components in a first image and a second image, the program comprising:

a first routine for performing a Hough  
25 transform processing to the first image and the second

image to generate a first transform image and a second transform image, and

5 a second routine for performing a matching of the first image and the second image based on a degree of an overlap of patterns in the first transformed image and the second transformed image generated in the first routine and a matching or mismatching of the patterns in the first and second transformed images.